## RUINED BY STRIKES.

H. S. Maxim Tells of Industries Driven From England.

TRADES UNIONS TO BLAME.

Causes of England's Decline as a Manufacturing Nation.

Lines of Susiness that Have Been Taken Away by Other Nations-Strikes Fomentod by Labor Agitators and Attempts to Limit Production and Hours of Labor-Greater Productiveness of Workmen on the Continent Than in Great Britain-Better Work, Too-New Englanders the finest Mechanicians in the World-Comparisons with Other Nations.

Lospos, March 13,-No man has had a wider experience with the modern resources of the nations in mechanical skill; no man has investigated more carefully and more practically the conditions under which manufacturing is carried on in the various countries; no man knows better the relative capacity of the English, the American, the French, the Gorman skilled workman than Hiram S. Maxim, the American inventor and experimenter, whom most Englishmen rank as the greatest mechanical expert of the day. The conclusions which Mr. Maxim has drawn from his wide experience in contact with the best mechanical skill of all nations are not only mighty interesting, but they will impress most students of industrial problems as being of vastly greater importance than a great mass of the reports and essays from so-called experts on these subjects. Mr. Maxim has someming practical to say, and he says it without reserve in the following interview, which he has dictated to an American newspaper man of his acquaintance:

There can be no question that England is not only the richest nation in the world to-day. but also the richest that the world has ever seen. Never before in the history of the world has there been so much accumulated capital and wealth as we find in the city of London today. This wealth is the accumulation of many hundreds of years, and represents the profits on manufacturing and commerce which have been tarried on in these islands. No matter in what country we travel we find that wherever there is an opportunity of employing capital profitably, there is an Englishman looking out for an opportunity of placing it. If we go to Spain we find English capital avested in tramways, gas works, and water works, and, to some extent, in the mines of the country. The same is true in Turkey, Italy, and Austria. We also find that English capital is largely invested in Russia, while in the United States the quantity of British capital invested is enermous. Many large manufacturing concerns in the States at the present time have recently been bought out by English capitalists, and are

now being run as limited liability companies. "All there foreign investments of British capital, of course, give employment to a great number of men, and the reason why these iniments are sought abroad is that the English capitalist finds that his money brings him better returns in giving employment to foreign workmen than to his countrymen. Moreover, capitalists do not like to be bullled by low politicians and vulgar labor agitators. Forty years ago England was by far the greatest manufacturing nation in the world. In America, if any one wanted a good saw, a good plane, a reliable file. or a chisel that could be depended upon, he insisted that it should be made in England; nothing except of English make would bring a fair price. At the present moment the Americans not only make their own tools, but are export-ing largely to England. At the time when it was necessary to pay forty per cent. duty on English steel to get it into the United States, the Americans purchased it, took it to the States, paid the 40 per cent. duty, manufactured it into twist drills and other small articles, paid about one and a half times the daily wage demanded in England, and sold at a price considerably below what the same ork could be produced for in England, a much better article than ever had been made here Take the Morse twist drills for instance. I have no doubt that these are largely manufactured from English steel on which a duty has been liable one they always demand the American drill made by the Morse Twist Drill Company. "A few years ago wille in St. Petersburg visited a large dealer in hardware. I asked him

where his tools came from. He said: Originally we got nearly everything from England. At the present time the very cheap and poor tools are made in Russia, the common tools that we sell to everybody are made in Germany: we get a few articles from France From England we only buy a few Stubb's files. rimers, and engraving tools, while our very hich-priced instruments of precision, such, for enmple, as micrometer callpers, squares, scales, rules, &c., come from the United States. lie told me that the sale of English goods

had fallen off lately so much that he was only teiling a small fraction of what he originally sold. Some few years ago if any one in Europe wanted a drill press, a turning lathe, a planer, or thaping machine, he was sure to get it from England. When the German Government decided to make their rifles on the American in terchangeable plan they purchased from Mesara. out & Whitney of Hartford, Conn., about \$1,500,000 worth of American tools. These were brought to Germany, and a very enterprising manufacturer in Berlin, seeing the great savantage of the American style of tools over those of European make, established a factory and commenced to build them on a very large scale. To-day this enterprising manufactures has not only practically driven the English tools from the market on the Continent of Europe, but he is also sending tools to England and selling them at prices considerably below those of English tools, and, moreover, as they are close topies of American designs, they are found to b much handler and better adapted to the work than tools of English design.

in regard to the supposed superiority of English-made tools I would say that when I first came to England, wishing to buy some lathes, I Stamined a large number made by different English manufacturers, and I was surprised to and how old-fashioned they were. Upon asking why they did not make better lathes, they con sidered it a good and sufficient answer to say: th, everybody knows that everything of

English make is very much better than anything made abroad.' "Hardly a manufacturer knew of the existeace of the new American tools. So when I had to equip some very large factories, I found it much to the advantage of my company to pur-

thas the greater part of the tools from Ameriit is only a few years ago that there was a Steat deal of shipbuilding on the Thames, and hearly every first-class ship, whether for the Germans or the French, came from England. At the present time the French and Germans building their own boats. I speak of this only to show that England is losing her relative Position as a manufacturing nation. I do not say that there is not a large amount of manucturing done in England at the present time,

but what I do say is that England has not been

able to maintain her relative position as a great

Especial control of the control of t have left England for other countries I would say. Take, for instance, the manufacture of hery, an industry in which England was time shead of all other nations. Machiner; is very inruely made of iron, and the designer always aims to have as much of the work as possible done on a lathe. The lathe may then Considered the principal tool employed in the enantacture of machinery. In the original bon-turning lathes it was necessary for the per-

son to hold the tool in his hand, and, of course, one man could work only one lathe. The turn-ing lathe was soon improved so that to-day it is quite automatic. Suppore now that a piece of metal has to be turned. It is mounted in a lethe: the tool is set and the lathe isstarted. The tool is automatically fed up and cuts off a uniform chip. As the lathe of necessity has to turn very slowly, it requires a very long time for the lathe to make one cut. In some cases the person does not have to sharpen or adjust a tool more than once a day, and this only requires, we will say, about five minutes. All the rest of the time he has nothing to do but watch the lathe, and in many cases he has all he can do to keep from going to sleep. The trades unions will not allow the British workman to run more than one lathe, while in Germany and France a man runs from four to six, according to the class of work on which he is employed. And the same is true of planers. "A great deal of the work in the Maxim-

Nordenfeit factories is done on milling machines. Before we had a strike many of the union men not only objected to work more than one milling machine, but wanted the company to agree not to allow any non-union man to work more than one. Some of the leaders in our strike ineisted that none but what they called skilled mechanics should work a milling machine. Since the strike we are employing unskilled labor on these machines, and one man runs as many as four. This is, of course, a decided advantage on the state of affairs before the strike, but does not compare very favorably with what they are doing in France. A few days ago I was at Barlquand & Marre's factory in Paris, where I found a very good-looking young woman running no fewer than fifteen milling machines, I remember some years ago I had a leading trades union man in France with me. I took him to Bariquand's place and showed him a woman working six machines. I called his attention to the fact that each machine was running about twice as fast and taking about twice as much cut as we were able to do in England-that is, that each machine was doing four times as much as the trades union men allowed a machine to do in England, and that the woman instead of working one machine was working six; that instead of receiving 816 pence or 1 shilling an hour, as we were paying in England, the woman only received 6 pence an hour, and I asked him how he thought we could compete with French manufacturers unless an English trades union man could be induced to do at least half as much as a French woman. On our return to England he attended a meeting of trades unionists, who at that time were seeking some question on which they might strike. He made a speech, in which he pointed out that one of our smaller factories which was then employing about 300 men would only be able to employ about sixty, provided that each man did as much work as the French woman he had seen in Paris. He said it would be complete suicide for the workmen to think of such a thing as working more than one tool.

"England is not a self-contained country. It would be quite impossible to produce in England one-half of the food required for the people. It is therefore necessary to make something in England which can be sold abroad to enable us to purchase the food which we cannot raise here. In order to have a sure market for our manufactures abroad, it is necessary that we should either make them cheaper or better than other nations are able to do, and I would like to ask how it will be possible for us to do so in the matter of machinery if a German or a Frenchman will work from four to six tools eleven hours a day and an Englishman will only work one tool about eight or nine hours a day. I would like to ask Mr. Tom Mann or Mr. Ben Tillett what would happen in an English shop if a Frenchman should come to England and do half a day's work. Suppose that I should go to France, find a Frenchman who was working six lathes; that should purchase three of the lathes and hire the Frenchman and bring him to England and set him to work among English workmen; that the Frenchman should do half as much work per hour in England as he had been doing in France, namely, run three lathes, what would happen? Would there not be a riot or a strike? Would the English trades unions allow any man

"When we first commenced to make Maxim guns, and before the strike occurred, the unionists used to take parts of the gun to a neighboring grog shop, where they held nightly meetings for the purpose of what they called 'rating the work,' that is, deciding how much time should be consumed in doing a certain amount of work on a certain part of the gun. I will only speak of one part, which is called the gib, which weighs about half an ounce. When the Maxim guns were made by ones and twos for experimental purposes these pieces were first forged, paid. Still, they are very largely sold in Eng-land to-day. In fact, if anybody wants a re-finally filed into shape. This piece was rated to guns came to be made by the hundred these pieces were milled into shape so that very little had to be done on them. Nevertheless no trades it had been milled in less time than a day and a quarter. If one man was taken off and another put on, it would always require a day and a quarter to do the work. One day a skilful German mechanic who did not speak English applied for a situation and was put onto this job. He did eleven the first day and twelve every day afterward, instead of doing one in a day and a quarter. A good many other parts of the cun were rated in about the same propor-While firing a Maxim gun in the States one of these gibs was broken, and I went into a local machine shop to have one made. From the time the bar of steel was cut off until the gib was finished and in the gun was exactly two and a half hours. This was making it from a

bar of steel. "In regard to the question of boards of conciliation and boards of arbitration, and so forth, would say that nothing of this kind is of the least value to the manufacturer. I think this can be seen by any one who will give it a moment's thought. Workingmen and even the trades unions are not responsible, while the manufacturer is. If a manufacturer agrees to anything in writing he has to live up to it. It is binding and means something to him, but no agreement amounts to anything with an irresponsible party like a workingman or a trades union, and, moreover, the trades unions have not the least regard for the truth. I suppose that, as trades unions go, the Amalgamated Soclety of Engineers might be considered the aristocracy among them. I do not believe any other stands higher. Nevertheless, when the atrike at our works was on the point of collapsing and we had hired a lot of French, German, and Italian workmen, a circular was issued by the Amalgamated Society of Engineers and signed by a considerable number of the members and secretaries, which set forth that the strike at the Maxim-Nordenfeldt works was caused by the tyranny of Mr. Maxim in greatly ncreasing the hours of labor and reducing the salaries. This trades union did not scruple to sign a circular which was an absolute falsehood. They perceived that the foreigner could not understand the nice technical point that they were striking on, so they had to invent a reason. In our case there was no real grievance. The men were paid the highest salaries in Europe. the hours of labor were the same as at all other places. We had employed a large number of men, and a few professional agitators came among them with a view of getting them to strike in order to give notoriety to the professional agitators. Many things were brought up as an excuse for striking. When one thing failed another cause was invented, and finally the reason why they struck was that we would

done in our factories. 'In regard to the industries that have left England, I would say that it would require a considerable time to give anything like a full account of them. I can only refer to a few from memory. For instance, machine-made lace used to be manufactured almost exclusively in England. Factories were established in France. where, I think, there never has been a strike in the lace trade (there was a great number of strikes among the lace hands in England), and

great that the Germans are now making crape ot only for the rest of the world but for England as well.

"At Crayford, where we have a factory, a certain concern used to have a specialty in a kind of printed linen goods which very closely resem bled woven woollens. This was very largely sold Cubs, and South America. practically had a monopoly of this business. The men were constantly striking. No sooner would a large order be obtained than all would strike for higher pay. The Chairman of this company told me that he had taken a large contract, at a very small margin of profit, but that no sooner had the men learned that he had received this order than they all struck for higher pay, and he found that if he acceded to their demands he would lose money on the contract. He therefore went to France and found a firm there who did the work for him. Upon delivering the goods to his customers, they wrote him that the work was beautifully done, being much neater and cleaner than anything they had ever seen before, and they hoped that all future orders that they might give him would be equally well done. When his men came to their senses and were willing to go to work again he found it was quite impossible to produce anything that would be at all equal to that which had been done in France. Finally the French printers found out the English process, and at the present time have got the work and the English factory at Crayford has been closed and the men are out of employment. The Englishman told me in a very mournful strain that he had noticed that whenever the Frenchmen or Germans got a job they kept it, that it was no use to try to compete with them with British workmen, and there was nothing for him but to

shut up his shop.
"I know of a very large firm which purchased immense quantities of wire. Some of the leading officials being members of Parliament, sought to place their orders in England, but found that the British workman was very stiff. He not only demanded a high price for his labor, but also sought to limit the output. Meetings were held and the question was discussed. The unionists were told just how much the company could afford to pay for wire, and as an argument they said: 'At the present time you are unemployed; we can give you so much. In case you do the work you will certainly be making enough to live on.' But the British workman was unyielding. He would not accept a penny less and consequently the work went to Germany. The German employer called his men together and told them that if they could produce wice at a certain rate they would receive very large orders from England, and that they would run the Englishmen completely out of the business. The German workmen not only expressed themselves as willing to accept the terms, but also in the future to make terms which would be sure to beat the British workman and keep the work in Germany.

"It may be interesting to the British workman to know that the rosy-faced French girl who was working fifteen milling machines at the same time, was engaged on a very large order for sheep shearing and clipping machines for

the British colonies. "The Merchandise Marks act, which was expected to do so much for the British workman, turned out, as I expected it would, an act to disillusionize the British public. Everybody was saying that British goods were much better than any others. Everything that was mean and bad was called German. Nevertheless, now that the goods are marked and the buyers are able to ascertain definitely in what country they are made, they cannot fail to see that gloves made in France, Austria, and Belgium are better than those made in England, while the prices are considerably lower. They cannot fail to see that a great many articles made in Germany are equal, if not superior, to those made in England. If a mechanic wants a square that is square he has no choice in the matter, but must of necessity buy one which is made in the United States because there are no squares that are square made for sale in England.

"A great many English manufacturers have been in the habit of getting their work done on the Continent and distributing it to their customers from England, the purchasers in the colonies and in foreign countries supposing that it was English make, but since the goods have been marked 'Made in Germany,' 'Made in France,' and so forth, the foreign and colonial buyers have been disillusioned, and they are now ordering their goods directly from the real posed to make them in England. So the Englishmen has not only lost the making of the goods, but has now lost the handling of them. The Merchandise Marks act has taken away his profession. He is not able to make any profit by buying goods in Germany and distributing

them from England "Regarding the comparative skill of mechanination has its own peculiarities and its own specialties. So far as my experience goes, and I have had a great deal of it, I should say that the New Englanders are the finest mechanics in the world. I think any one who has investigated the subject will have to admit this. The tools which are designed and made in New England are incomparably ahead of those made in any other country. There is nothing in Europe that can at all compare, for instance, with the tools made by Brown & Sharpe of Providence, R. L. Pratt & Whitney of Hartford, Conn., and the American Tool Company of Boston. The Americans also excel in the manufacture of revolvers and sporting rifles, while for wood-working tools and machinery they are far shead of all other nations. They are also ahead in automatic machinery for working metals and also in boot and shoe machinery, &c. There are, perhaps, about as many great inventious made in the United States as in all the rest of the world. The English may be considered the most skilful manufacturers of high class woollen goods. They are quite equal to any in the manufacture of velvets and plushes. The handmade double-barrelled guns used for sporting purposes have reached a higher degree of excellence in England than in any other country. The English also have a leading position as builders of ships and marine engines. Microscopic and photographic apparatus is also very

well done in England.
"As the brightest mechanics in the world are the New Englanders, and as a New Englander is only a modified Englishman, I do not see why the English themselves should not have continued to be the best mechanics in the world, as they were the first in the field, and they might have continued to lead all other nations if the English employers had taken interest in their business, and the workmen had attended to

their work instead of organizing strikes. "I find that the Germans are very good mechanics; they are quick to appreciate the advantages of a new system and to adopt it. The German tool makers have profited very largely by the introduction of American tools. Only a very few such tools, as, for instance, milling Germans imitate every mortal thing of any slightly inferior to that of the Americans, I have purchased and compared genuine American tools with German imitations, and have found that the castings of the former are sounder and stronger, and that the deviation from truth, though very small, in the German tools, s three or four times as great as in well-made American machines. The Germans excel in all sorts of cheap bronze articles, colored printing. &c. While the Austrians are very backward in tool making, they excel in leather work.

"The Frenchmen are all-round good mechanics. The imitation of American tools made in France are nearly as accurate as the genuine articles themselves, while their instruments of precision are quite as accurate as those made in as is done there, and so the price of the French instruments is four or five times as great as the American. The French are a nation of workers: they seem to like it, and I believe, everything considered, the Frenchman is the best mechanic in Europe.

"In regard to Spanish mechanics, the number at present the French are making more lace than the English.

"At one time England made crape practically for the world, but the number of strikes was so tifully executed, and perhaps superior to anyof manufactured articles which the Spaniard

thing else that is done in the world; but as allround mechanics the Spaniards cannot be con sidered in the same category as Americans English, and French. My company purchased the old arms factory of Don Carlos at Placencia, in Spain, and we have equipped it with new tools and are making there a considerable number of quick-firing guns for the Spanish ser-

vice. Placencia is a little village in the Pyrenees. All the workmen we employ are Basques; in fact, I do not think there is anything except Basques living in the vicinity. These are a peculiar people, and I have never seen so high a grade of morality among any people as the Basques at Placencia There is absolutely no-dishonesty or immorality in the town. If any one should purchase a load of bread and not pay for it, it would be the talk of the town. The factory which we purchased was open, so that any one who liked might enter, for years before we purchased it, and not a scrap of steel or brass was stolen. Had this factory been at Crayford or Erith, it would have been completely gutted the first night that it was left unlocked.

"I was very much amused to find such a large

number of very small gun shops, little shops about eight by ten feet, employing about two men, and everybody was working on Remington rifles. They sold a complete rifle for about \$2 with 100 rounds of ammunition. I asked how this was done, and found that the barrels of the guns were rejects from Belgium, that all the mechanism of the gan was made of malleable rou and case hardened. Upon examining one of these guns I found marked on the barrel Manufactured by the Remington Arms Co., llion, New York, Patented so and so.' I asked them why they stamped this on the barrel, and they informed me that the guns they made were sent to Africa, and nobody in Africa would buy a rifle that was not made in the States. Each factory had a genuine Remington rifle as a model, and these were used as jigs and gauges for the imitation guns which they were making. "On my return to England I was waited upon by a lady who said she came to collect money for the Spanish mission. I told her I never had

given a cent to missionaries because I had always understood that as a rule missionaries were the greatest humbugs under the sun. In fact, I believe that missionaries get us into a lot of trouble everywhere, and it would be a good thing if there were no such thing as a missionary in the world. However, I had just returned from Spain, where we had a factory, and I must say I felt some interest in a Spanish mission. felt that at last the time had come when I could conscientiously do something for a mission. She was very quick to whip out her book and pencil

'How much shall I put you down for?' "'That depends,' I said. 'How many Spanish missionaries do you propose to bring over, and

will any of them be located at Crayford? "She healtated for a moment, seemed to be very much amazed, and said: "'Oh, we do not propose to bring Spanish missionaries here, we are going to send English

missionaries to Spain." "I then told her of the high morality of the Spaniards, and said:

'Now, madam, you know what class of people we have at Crayford. Would it not be more in order to bring some Spanish priests out here to try and convert the barbarians that we have about us here than it would be to send your priests out there in order to induce a highly moral people to change from one kind of Christianity to another?" " 'Oh,' she said, 'but I think you must admit

that the Spaniards are priest ridden." "'l'erhaps so,' I replied, and asked her if she could tell me how much it would cost to get half a dozen Spanish priests to come to Crayford and Erith, as it might pay the company to employ some, provided that it did not cost too much. She went away without the subscription.'

OIL AND WATER FROM ONE WELL. An Artesian Frenk in Process of Development in Texas.

From the Galveston Daily News Considered by the Corsidena Commercial Club after its organization in January of last year was the question of an inexhaustible water supply, it being considered absolutely essential to the future of the city. Under its auspices a water development company was soon organized, and at once contracts were let for putting down three artesian wells.

The first of the wells, now nearing completion, is Corsicana's wonder. The plant, consisting of a derrick or tower eighty-five feet high, a twenty-horse-power engine, and other heavy machinery necessary to accomplish the work, was put in place on a lot near the centre of the city last April, but active work did not commence until May. Passing through the surface soil the ponthis stratum the well was continued to a depth of 1.550 feet. At 1.050 feet a vein of oil was struck, which proved to be petroleum of very fine quality-so fine, indeed, that many barrels of it have been sold for lubricating purposes This strike naturally caused some comment, but water was the object and the work proceeded. In the mean time the premises became saturated with the oil, which covered the water drawn from the well in the process of digging. The drill pulverizes the rock and water is poured in from the top, and forming a thin solution of the pulverized stone makes it possible to clean out the hole. One day a boy, with a boy's natural curiosity, applied a lighted match to the oil on the waste pile, 150 yards from the well, to see if it would burn. It did, and in an hour the entire plant was destroyed by fire. This was in October last. A new plant was, however, erected, and the

work proceeded. Very little was thought of oil, the superintendent thinking its flow had been stopped by the caving sides of the well. The work continued, passing out of the marls. At 1,550 feet the Austin-Dallas chalk was struck and continued in for 450 feet. Engleford shale was at this depth encountered. Geologists place the thickness of this stratum at 400 feet. The drill pounded its way 200 feet through this. One day in January, when the men had gone one day in January, when the men had gone to dinner, the plant was discovered to be for a second time in flames, and was again destroyed. The cause of this fire was a mystery until it was discovered that the oil had risen from a depth of 1,050 feet below and completely saturated the ground beneath the floor of the well tower, and a cinder failing from the former through the floor had caused the trouble. Before rebuilding the tower a pipe was laid from the outside of the well pipe to a tank seventy-five feet distant to carry off the oil. This proves to be an artesian flow running about two barrels of oil per day. The strange condition is that the oil forces itself up the outside of the well pipe through the earth from so great a depth. It must first have saturated the marks and soil for a considerable distance out in all directions from the pipe before reaching the surface. This strange flow has continued for several weeks, and shows no sign of abating. The contractors are using the oil for fuel in their boiler, and thus save about \$7.50 per day that would otherwise be spent for coal. The oil is blown from a pipe connected with the tank by a steam jet into the fire box of the holler, and creates an intense heat. If the work continues long enough the contractors will doubtless in this manner be recumpensed by the oil for the loss it has caused them. The contractor, who is experienced in oil wells, says that while there are a number of wells from which the oil is forced by gas, this is the only one in the world that has a natural artesian flow, there being practically no gas in it. As to the water part of the well, it is being not through the following strats: Ponderoca marks, 1,530 feet; Austin-Dallas chalk, 450 feet; Eagleford shale, 300 feet. After passing through 100 feet more of the latter it is now thought the green sand artesian water for feet per day, and has reached a depth of 2,300 feet, it has gone through the following strats; ponderos marks, 1,530 feet; Austin-Dallas chalk, 450 feet and of the well wi to dinner, the plant was discovered to be

NOTES ON SCIENCE AND INDUSTRY.

In one of the latest described designs for s

cotton mill that have met our eye, two engines are provided, working independently of each other, one, which is of relatively small size, being employed in driving the looms or the whole of the weaving department, while the other, or main engine, carries the balance of the load. The large engine is a compound, arranged for generating power with the utmost economy, while the smaller engine has two cylinders, and either one of these, or both, can be run condensing or non-condensing. The practics in warm weather is to run only one of these cylinders condensing, and use the exhaust steam from the other for heating the slashers steam from the other for heating the shahers and warming the feed water. In cold weather both cylinders are run non-condensing, and all the steam exhausted is used for heating—in this case one condenser is used for both engines, being of the jet type with an independent air pump driven by steam. The feed water passes through a tubular heater located in the exhaust pipe of the large engine, where it is heated to a temperature of about 120°, then into an open heater, which receives water of condensation from the various drips of the plant and from the slashers, and here it is further heated by means of the exhaust from the small engine to a temperature of some 210°. The air pump exhausts perature of some 210°. The air pump exhausts into the condenser.

An improvement in machines for chain making is set forth at much length in the Providence Journal. The main feature is in the device for forming the links from a wire, of which any necessary amount is carried on a wheel rotating on an adjustable mandrel having a cross-sec tional shape similar to that of the proposed link. and as the wire is colled around the mandrel it advances along it, passing under a saw, which separates the coils of wire into links. A feed derice now grasps the foremost link and moves it along the mandrel to the exact position to be taken up by the jaws of the link carriage, the base of which is traversably mounted on a track in line with the link mandrel; the carriage in line with the link mandrel; the carriage proper is furnished with oppositely rotatable and reciprocal jaws, which are held in the open positions by springs, while they are closed by a lever, having a slot with inclined sides, in which pins on the law frames move—the drawing of the lever thus tending to close the jaws together, while the releasing allows the springs to act so as to open the jaws and release the link. The reciprocation of the carriage is effected by a series of novel cams and levers interworking with one another, the rotation of the carriage and its jaws to exert a tornional opening of the link being accomplished by a rack and pinion movement.

macher process of hydraulic forging, so fully developed in Germany, has been introduced in England by a Leeds concern, who have made a press that exerts a pressure of 700 tons, and can make long and slow strokes or short and quick ones, as desired; a large steam cylinder is used instead of a pumping engine, the piston of which is prolonged and acts as a ram for exerting bydraulic pressure on the forging tools through the medium of a second hydraulic cylinder. over the press to lift the forging crosshead, by which the upper forging tool is carried, and, when it is desired to work in the ordinary way with heavy pressure, the admission and exhaust of steam in these lifting cylinders is controlled by the same lever which regulates the admission and the exhausting of the steam in the large driving cylinder; but for quick working, direct and uninterrupted communication is established by means of a separate cock between these lifting cylinders and the boiler. In this way there is then always the full boiler. In this way there is then always the full boiler pressure beneath the cylinder, tending to keep the crosshead and upper tool at the top of the stroke, but the main steam cylinder, which puts on the forging pressure—through the hydraulic mechanism—is of so much greater area than the combined area of the two small cylinders that the crosshead is pressed down with considerable force, although of course with less force than if the two lifting cylinders were exhausting in the usual way. over the press to lift the forging crosshead, by

It is stated that M. Faure, an Austrian manufacturer of plush and velvet power looms, has the whole of his cutting apparatus made of aluminum, and finds that various advantages are to be gained in this way, especially in reference to lightness and strength. In older methods, it is remarked, the weight is disagreeably perceptible, the speed of the apparatus being thus considerably interfered with, as well as its stability, drawbacks which have repeatedly led stability, Grawbacks which have repeatedly led to unsatisfactory results. Again, the apparatus previously in use worked backward, with the help of an endless catgut string, and was thus exposed to serious shocks, and it was therefore found advisable to abandon steel and iron and resort to hard wood; but while the weight was undoubtedly diminished in this way, it still remained too great, the parts easily altering their position and shape and soon wearing away. On the other hand, aluminum, it is claimed, is liable to none of these defects, being light and stable. One of the most interesting mechanical pro

cesses as now practised is that resorted to for the drawing of wire. The rod is received by the wire drawer in the form of a coil, the rod being of varying section and the coil of a weight dopending upon the purpose for which it is intended. One end of the rod is pointed and somewhat reduced by machinery, and the coil receives a bath in mild acid to remove all oxreceives a bath in mild acid to remove all exidation, then is washed in lime water to give a drawing surface, and finally dried in a suitable oven. When ready for drawing, the pointed rod is inserted in one of the holes of a drawing plate, the latter being generally of steel, though chat from is in some cases used; the drawing holes are conical and the rod is inserted from the larger end, while on the other side of the plate the pointed end is seized by power pincers and pulled until enough has been drawn through to allow of its being passed around and fastened to a drum or reel which is driven by power; of course the rod is reduced in area and much elongated, and this without any perceptible loss of metal. While passing through the plate it is kept lubricated with what is called wire drawers soap or grease; and after being drawn through this first hole it is put through a series of smaller holes until it has been brought down to the requisite size. But the compression and disturbance of the structure of the rod consequent upon these reductions have hardened it so much that at certain stages it is necessary to stop the process and soften the metal by annealing; it is then again washed in acid, &c., and the drawing resumed.

According to a communication in one of the idation, then is washed in lime water to give a

According to a communication in one of the German journals relative to the new paper invented by John Schultz, of Lautenberg, West Prussia, the manufacture of which has been prohibited by Government authority, the paper is composed of give, asbestos, and the ordinary ingredients used in the production of such material. The moist sheets, immediately after leaving the rollers for the first time, are placed in a bath of concentrated sulphurle acid, to which some ten or lifteen per cent, of distilled water has been added, and which must be kept at a temperature of 20° R. According to their thickness, the sheets are left in the liquid five to thirty-live seconds. After having been pressed between glass rollers, they are put into pure water, next into a solution of ammonia, and finally into water again, such process being followed by hard pressing, passing through felt rollers, and drying between polished and heated metal cylinders. The paper resulting from this process has the appearance and properties of ordinary note paper, but it is stated that even the most acidiferous ink can easily be washed off with water after any length of time, and on account of this quality its manufacture is under Governmental interdict. such material. The moist sheets, immediately

At one of the recent meetings of the Iron and Steel Institute in the city of Brushels some interesting facts and statements were considered concerning the deep mine shafts which have been sunk in that country. As long ago as 1844 the late Prof. Devilles of the Mons School of Mines declared that shafts to a depth of at least 1,000 metres could be successfully ventilated and worked, and his assertions are now borne out by current practice. At Viviers the depth is stated to be 3,700 feet and at Viernoy 3,300 feet, though both of these have for some time been abandoned for lack of coal in paying quantities. The shaft at Prodict's collery has a depth of 3,800 feet, with an incline reaching to 3,800 feet, said to bothe greatest depth yet reached in the coal fields of Helgium. The pumps required for drainage are necessarily powerful, though small to come within the limits of restricted space. In some cases foundations are omitted, the number held in the first to from beams built into the masonry. At St. Catherine's shaft of the Bossoud colliery, the pump forces the water to a height of 1,180 feet, while at La Louviere the head of over 1,875 feet is handled by one pump. Mines declared that shafts to a depth of at least

CASSOWARY POCKETBOOKS. Conditions on Which a Man of Moderate Means Could Do Without One,

"In a Broadway window the other day," said man of moderate means. "I saw some pocketbooks and other things of one sort and another that were made of cassowary, plyskin, ele-

phants' hide, and water snakes' skin; they were beautiful, every one.

"No doubt there is a reasonable delight in the possession of heautiful things; I would like to have a booketbook, for example, or a card case, of any one of these materials; and yet I feel that I could get along very comfortably for quite a spell yet without a cassowary pocketbook if I had a little more money."

RECENT SUCCESSES IN ARMOR.

Their Suggestions in Regard to Thickness of Plates and Size of Guns. WASHINGTON, March 23 .- In the never-ending contest between gun and target, the latter is for the moment taking its turn at winning the chief laurels, thanks to certain remarkable performances of Harveyized plates at Indian Head These tests are timely, in view of the approaching construction of new battle ships for our navy, and the results will no doubt receive careful study.

Several years ago a reaction set in against the oig 16-inch guns employed in the British and other navies. This was due to several causes. One was that some of them had shown great defeets, and their use was discredited for naval purposes. But a second objection, not depend ng on faults of design or manufacture; was that they fired of necessity so slowly that it was not practicable to secure the penetrative or smash ing effect without less of rapidity of discharge. till another consideration was that it was deemed highly desirable, in case of accidents to machinery, not to depend exclusively on hydraulic or other apparatus for manipulating guns, and that only such calibres should be employed as could use hand power. If need be, For these reasons the British Admiralty de-

ermined that hereafter no guns larger than the 12-inch should be mounted, and a leading consideration was the assumed fact that this calibre could easily penetrate and make ineffectual any armor carried on any war ship in the world. Some British naval officers were even for reducing the maximum callbre to the 10-inch. It is in relation to this question of what should be the maximum calibre of guns, and also in relation to the thickness of armor needed for existing guns, that a review of the recent trials may be useful.

The first of these tests was made by the Carnegle Company, as an experiment. A 17-inch plate, having received the Harvey treatment previous to being forged, instead of afterward. as is now customary, was then forged down to fourteen inches by re-heating and rolling. The

as is now customary, was then forged down to fourteen inches by re-heating and rolling. The texture having thus been toughened, its surface was sprayed with ice-water to secure the advantage of chilled hardening. Then it was attacked by a 10-inch gun with a striking velocity of 1,859 feet per second. The point of the projectile penetrated just about half way through the plate, and then, as was recorded at the time, it went to pieces, while no crack whatever was developed in the plate. It will be observed that this was a 500-pound Carpenter projectile, and that the striking energy was close upon 12,000 foot-tons, a charge of 217 pounds of brown prismatic powder having been used. The velocity was equal to the maximum required for accepting Harveyed plates.

The next shot was irred with 225 pounds, and a velocity of 1,940 feet per second, yielding a striking energy of 13,400 tons. Although in the same vertical line with its predecessor, the second hole showed no crack around it, while the shell, which had penetrated only about two inches deeper, was also broken into fragments. Then came the third shot from a 12-inch gun, with its 800-pound projectile driven by 420 pounds of powder, at a striking energy of 1,858 feet per second, and a striking energy of 1,858 feet per second, and a striking velocity of 1,858 feet per second, and a striking velocity of 1,858 feet per second, and a striking velocity of 1,858 feet per second, and a striking velocity of 1,858 feet per second, and a striking velocity of 1,858 feet per second, and a striking velocity of 1,858 feet per second and a striking velocity of 1,858 feet per second and a striking energy of 20,370 foot tons. This went through the plate; and yet, instead of plunging through the oak backing into the bank, as had been expected, it scarcely more than entered the butt, while, what is more important, the plate even under this third shot was wholly free from cracking.

The lesson of that trial seemed to be that by this method of forging, should subsequent tests confirm i

ture around the hole, so that the plate was nearly as good as ever.

The velocity in that first shot was only 1,465 feet, this being the contract velocity for the cracking test, which was successfully passed. For the second, or penetration test, in which cracking was expected and did not count, the powder charge was 395 pounds, and yielded 1,956 feet of initial velocity. Even with this charge the projectile striking at the right of the first impact, did not get quite half through the plate, so that the plate was passed without question, and with it the whole lot which it represented. One vertical crack was developed from the top to the bottom of the plate, but it was very harrow.

It is true that by the use of smokeless powder

was very narrow.

It is true that by the use of smokeless powder a somewhat higher velocity can be given to heavy gans; but the maximum velocity developed in the tests is considered to be well up to current service requirements. On the other hand, the target in this last trial was only 200 feet from the gun, whereas the actual distance of an ordinary naval combat, whether between ships or between forts and ships, would be much greater. It will be recalled at what distances the battle of the Yalu was fought.

Still more noteworthy is the fact that, what with the rolling of battle ships and the angle

Still more noteworthy is the fact that, what with the rolling of battle ships and the angle presented by the opposing ship's side, the gun can only by chance secure the exact normal impact of the proving ground. Thus it becomes a serious question whether the Harvey process does not require either that in some way greater nower shall be given to the 10-inch and 12-inch guns, or that larger calibres shall be allowed.

Certainly the argument for using 13-inch guns in our Indiana, Massachusetts, and Oregon, and also in the two now battle ships of the Kearsarge class, is greatly strengthened by these

## THIS WINTER IN MEXICO. Suffering and Death from Cold as Far South as the Capital City.

Suffering and Death from Cold as Far South as the Capital City.

From the Beston Herald.

City or Mixico, March 9.—This rigorous winter, which has come along to disprove the theory put forth in recent warm winters that the globe's climate is radically changing, has been severely felt here. With snow actually falling at Tampico and along the Alvarado coast by the Gulf, and with the people at Vera Cruz huddling around braseros with charcoal to keep their inners warm, we have had all the proof needed that the winter was an unusual one. It has been very cold up in the northern States along the fronter, where cattle have perished and the thinly-clud herdsmen, too.

In this central part of the republic the cold has been felt and made evident by the immense mantles of snow on the volcanoes of Popocatepeil and Istaccibuati, which even to-day make a very wintry picture against the turquoise sky of this high altitude. Old Ajusco, where wheat and postness are grown at an elevation of 9,000 feet. The frost has been a severe one.

Go down into the hot country and you do not escape the chill in seasons so remarkably cold as this one. A wind comes rushing down from the high mountains toward night, bringing with it a sensation of an invasion of Boreas and all his crew. The people in the hot country do not freeze, and no frost comes, but one's blood is thin down there, and a fall of five degrees is severely felt.

Unitered in the capital we have not seen show except on the tops of the engirdling mountains, but there has been a snow "feeling" in the air, and the deaths from chill of many poor people have been recorded. Under the arcades around the Plazz Mayor at night haddle many homeless people who, in their thin rags worn so that even the paper makers refuse them, are as sensitive to 32° as a Boston beggar to zero or helow.

In times like these, one would give a good slice of the tropics for a cosey bedroom with an open hearth fire. There is no fun in cold, if you aro not prepared for it, and in the thin air of this lofty regi

in January.

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In January.

The prejudice against fires might logically be carried so far as to prohibit the warmth of a lamp in a chamber or against thicker clothing or a warm bed. In Loadville, which is a good deal higher up than the City of Mexico, and where the air is thin enough, fires abound, and so also in Santa Fé in New Mexico, where, in April, I have seen it show and blow, and have found a cheerful wool fire mighty comforting.

One begins to think that the southern races, accustomed the main part of the year to a warm climate, come to cutertain a baseless prejudice against artificial heat. During the greater part of the winter the people here do not really feel the cold, excent at highfrall and in the early morning. The poor shiver in their cotton garments, and samply lave to endure their sufferings. Yea will see them in the city by hondreds at 0.4. M. taking imitation reflee around the street stands. For even in a coffee-growing country it is not every one who may enjoy a genuine cup or fragrant Cordova or aromatic Uruapam. But, so long as the beverage is hot, it comforts the poor man and sends him to his work a little better prepared for a day of toil.

LEADERS OF THE CUBANS.

MEN WHO ARE FOREMOST IN THE STRUGGLE FOR PREEDOM.

Mneco's Colonization Scheme-Crombet as a Pisherman-Marti's Patient Labor of Love in Organizing the Patriotic Cultums. The first time I saw Gen. Macco, the dauntless Antonio Macco y Grajales, for whose coming the Cuban insurgents hiding in the hill ranges from Santiago all the way up to Puerto Principe and beyond are waiting and praying, was about four years ago, in Costa Bica. I was breakfasting in a hotel at San José, that white jasmine-like city that lies in one of the most beautiful valleys of the world, the Aserri paradise, extending from the indige shadow of the volcane Irazu to the exquisite sapphire Candelarian hills. A tass man entered in ordinary citizen's clothes, a mulatto at the first glance, but clearly a person of distinction. As I knew almost every one in the city and almost every one knew me as an Amercan and a correspondent, it was not long until I

made the General's acquaintance.

Exquisitely neat in appearance and perfect in breeding, with a certain reserve and modesty of bearing, he could not fail to interest one who had heard of him as a brave young leader in # struggle for his country's freedom twenty years before. Gen. Macro was in Costa Rica looking for a colony site and a Government concession. He was not exiled there, or in any way under Spanish surveillance, as one might believe from reading a recent Tampa despatch to the effect that the Spanish Consul had been removed for allowing Macco to escape. He was there to see about locating a colony of his countrymen. He wanted a site on the Atlantic side, that coast being the more accessible, but he had to take what he could get up in the peninsula of Nicoya on the Pacific. The Costa Rican Government gave him as its reasons that too many other enterprises had first choice on the Atlantic coast. But the General let me into the secret of his suspicion that the Spanish Government had requested Costa Rica not to give the proposed Cuban immigrants, who would naturally be revolutionists, a too advaningeous site for the embarkation of an expedition at short notice. Maceo finally accepted the remote lands, and entered into a very interesting agreement with the Minister of Fomento (Public Works), by the terms of which he promised to bring into the country some five hundred and ultimately a thousand Cuban families -no negroes to be admitted. Just how much colony, which would have been an undoutted benefit to the country, and which in the event of a long-continued war in Cuba will be postponed and in the event of a successful revolution be abandoned, it is hard to say,

I believe Maceo was in earnest in trying to get the contract. He had given up hope of another struggle for years to come. Pacific and suave he went about the streets of San José at-tending to his business, like a man who had never been wounded, or driven to hide in mountain fastnesses and starve there for days, or to escape in a small boat by night and drift out to sea to lie, festering and delirious, under the burning tropical sun. Cuba's freedom was only a question of time, he said calmly. The

the burning tropical sun. Cuba's freedom was only a question of time, he said caimly. The only time he showed any excitement was when news came of Flor Crombet's escape from Cuba and the confiscation of his property. Then Gen. Maceo got himself ready in short order and went down to hot Port Limon to meet his brother warrior. They came up to the capital together, and I had the pleasure of receiving the two big feilows at my home.

Flor Crembet is a man one couldn't help liking. Frank as a boy he admitted he didn't care to go into Gen. Maceo's colony scheme, but he thought he would stop a while and see the country. His complexion showed nothing of the African, but suggested Indian blood. He had a direct, honest giance and the pleasantest way in the world. The scar on his face seemed to want to apologize for being there alread of time—that is, before Cuba is a country. To amuse himself and make a little money he bought a fishing smack and set to work catching fish along the coast by Limon. Now, the sea along the coast is the nastiest bit of water for making one repont that one could imagine. There is a horrid choppiness all the way down toward Bocas del Toro—but the fish are certainly fine. Crombet sold all he could catch, and nobody appeared to think he would turn his boat to expeditionary purposes. He was unmolested and cheerful as a school child. Occasionally he came up to San José—and Maceo and he certainly made a fine-looking pair. Nobody eversaw them engaged in any mysterious conference or plotting. Maceo was very friendly with a family that had lately come from Cuba, a Spanish family, or, at least, loyal to the Spanish rule, for the Spanish Minister was also a great friend of theirs, and Gen. Maceo and he must have mea very often at the house. The meetings were without the slightest annoyance or feeling on either side, I am confident, for Señor Arellano, the Minister, who is now in Guatemaia, I think, is a most delightful man, and Maceo mas also delightful in a social way. Only it seemed a little odd that t

nest, enthusiastic, dering. From a personal knowledge of the pair, I should say that if they are really on Caban soil It simply means that the astounding success of the revolutionists may be looked for I say astounding success because such a victory against such terrible odds should astound the world. Macco would never waste his life or Crombet's; If they are in Cuba, it means the beginning of the end.

Carrillo and Sanchez I met at a steamer on my return to New York not long after, where with the patriot Marti, they were seeing off some Cuban friends bound for Costa Rica-Carrillo affable, full of hope and good spirita, in appearance more Saxon than Latin; Sanchez pale, serene, contemplative, with these words on his lips:

"I can assert without boasting that our war first with all its miseries and dangers, and our

"I can assert without boasting that our war first with all its sorrows and losses, have only succeeded in making me atronger in my first belief. The task to which I have consecrated myself for twenty-five years I shall not desert to-day at forty-seven. What I cannot do is to leave my country in slavery through my indifference and lack of patriotism." Sanchez, was pale and still suffering from the wound in his leg from the builet that killed the horse he rode when fighting under Gen. Roloff in 1876. I have before me a little book he has written, "Humble Heroes." The simple tales of Cuban patriots, told with pathos and modesty, are part of the revolutionary propagatida, which has uttained to splendid proportions here in New York and wherever elect he Cubans await the day of their deliverance. The network of clubs and leagues stretching from New York down to Tampa and Key West is perfect. It has been woven patiently and with consummate art, There is not a weak apot in it. José Marti has taugit his followers how to weave it.

Is Marti with Maximo Comez in Cuba 7 is asked. I hardly think see. Marti's sword is his pen, a weapon that will do more for the cause than many swords, perhaps. Once, five or six years ago, it was my privilege to be a pupil of this remarkable man. At that time he had just resigned several important and lucrative South American Consulships rather than desert the Cuban cause, and was quietly pursuing life aspatriot and teacher. The coacy office now occupied by the revolutionary paper, Patria, at 120 Front street, was then his headulariers and the scene of many exciting parfold meetings. Punils, like myself, who studied there with the "mnestro," as he was affectionately called, can never forget the place, I never saw another room so full of books. There were shelves to the ceiling, and movable bookcases and tables and chairs loaded down with books and magaines and papers. All languages were represented in that precious collection, which had not a single ownthan and in the substitution of the fain